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Lyme Disease: 2005 Update for Maine Clinicians

Background: Lyme disease is one of the most commonly reported infectious diseases in Maine, with an average of more than 200 cases reported annually from 2002 to 2004. This year, 40 reported cases had been confirmed by the Bureau of Health through July 31st. While there have been relatively few recent changes in the recommended approaches to diagnosis and management of Lyme disease, Maine clinicians should be familiar with the basic clinical and epidemiologic features of this disease and include it in the differential diagnosis as appropriate. Consumers have become increasingly familiar with principles of prevention and recognition of Lyme disease, but misinformation is also widely disseminated on the internet and elsewhere. Below, you will find a brief summary of current perspectives on recognition, prevention, and management, with links to reliable and more detailed information.

Epidemiology: Lyme disease is transmitted to humans by the bite of an infected deer tick (*Ixodes scapularis*). In Maine, the greatest concentrations of deer ticks are found in southern coastal areas, but populations of ticks are increasing along the midcoast and in parts of central Maine. In 2004 most reported cases of human Lyme disease occurred among residents of York county, Cumberland county, and Lincoln and Knox counties. A map produced by the Maine Medical Center Vector-borne Disease Laboratory (http://www.mmcri.org/lyme/tickmap.html) illustrates the distribution of deer ticks submitted by Maine residents since the late 1980's. Deer ticks are significantly less common in northern and western areas of the state, but clinicians should realize that exposure to infected ticks is possible in virtually any potential tick habitat in the northeastern United States. In Maine, most cases present between May and August with a second smaller peak in October.

Clinical Presentation: More than 70% of persons with Lyme disease will develop the characteristic rash known as *erythema migrans* (EM) at the site of the tick bite, within 3-30 days of exposure. EM rashes expand in size over several days (up to 30 cm in diameter), may develop central pallor ("bullseye" appearance) over time, and may be accompanied by fever and other constitutional symptoms.

Persons who are untreated at this stage of infection may develop a variety of other conditions over days to weeks including aseptic meningitis, Bell's palsy and other cranial neuropathies, migratory arthralgias, atrioventricular blocks, and radiculoneuropathy. After a period of months, 60% of untreated patients will have intermittent bouts of arthritis, predominantly affecting large joints, especially the knees. In addition, 5% of untreated persons can develop chronic neurological complaints, months to years after onset of infection.

Laboratory Diagnostics: The diagnosis of Lyme disease should be made on the basis of clinical examination, likelihood of deer tick exposure, and (if indicated), the results of laboratory testing. Persons presenting with a possible *erythema migrans* rash should be diagnosed and treated on the basis of history and clinical examination, as laboratory tests may not be reactive at this early stage of infection. For persons with other signs and symptoms that may be attributable to Lyme disease (see above), the Centers for Disease Control and Prevention recommend a two-step process when testing blood for evidence of Lyme disease. Both steps can be done using the same specimen.

1) The first step uses a sensitive ELISA or IFA test. If the ELISA or IFA is negative, it is highly unlikely that the person has Lyme disease, and no further testing is recommended. If the ELISA or IFA is positive or equivocal a second step should be performed to confirm the results.

2) The second step uses a Western blot to test for IgM and IgG antibodies. A negative Western blot suggests a false-positive ELISA. Persons with a positive IgM and a negative IgG should be retested after one month if illness persists. If tests continue to identify a positive IgM in the absence of IgG, a false positive test is likely.

Cautions regarding Lyme Diagnostic Tests: CDC does not recommend testing blood by Western blot without first receiving a positive screening test result by ELISA or IFA, because of the potential for false positive results by Western blot alone. Clinicians should also be wary of nonvalidated test methods used by some commercial laboratories, including polymerase chain reaction (PCR) testing of blood, urine antigen tests, and lymphocyte transformation tests. Some laboratories also interpret Western blot tests using criteria that have not been validated and published in peer-reviewed scientific literature (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5405a6.htm).

Treatment: Most cases of Lyme disease can be successfully treated with a course of 10 days (*erythema migrans*) to several weeks of oral antibiotics. Meningitis, recurrent arthritis, and 3rd degree AV block often require parenteral therapy. Treatment recommendations have not changed dramatically in recent years. In 2000 the Infectious Diseases Society of America published treatment guidelines(http://www.cdc.gov/ncidod/dvbid/lyme/IDSA_2000.pdf), which are summarized below.

Indications	Preferred Treatment	Duration (days)
Erythema migrans Cranial-nerve ("Bells") palsy 1st or 2nd degree heart block	Oral amoxicillin or doxycycline	14–21
Arthritis without neurological symptoms	Oral amoxicillin or doxycycline	28

Recurrent arthritis after oral treatment	Oral amoxicillin, doxycycline or	28
	Intravenous ceftriaxone	14-28
3rd degree heart block	Intravenous ceftriaxone	14-21
Meningitis or radiculopathy Late central or peripheral nervous system disease	Intravenous ceftriaxone	14-28
Persistent arthritis after 2 courses of antibiotics or "post–Lyme disease syndrome"	Symptomatic therapy	NA

In addition, the *Medical Letter on Drugs and Therapeutics* published updated treatment recommendations on May 23rd, 2005. (http://www.cdc.gov/ncidod/dvbid/lyme/resources/1209Lyme.pdf_)

For patients with chronic persistent symptoms despite recommended therapy for acute disease, prolonged antibiotic treatment does not appear to be effective (http://content.nejm.org/cgi/content/abstract/345/2/85) . Primary care providers should consult with an infectious disease physician or other appropriate medical specialist regarding treatment in more advanced or complex cases.

Prevention: Although the risk of acquiring Lyme disease and other tickborne infections varies geographically, it may be difficult to pinpoint areas of risk in a manner that can be applied usefully for prevention. For this reason, the Maine Bureau of Health recommends that persons adapt a "universal precautions" approach when recreating or working in potential deer tick habitat (deciduous woods and brush and areas with lots of leaf litter) in any part of Maine during the warmer months of the year. These measures (http://www.cdc.gov/ncidod/dvbid/lyme/Prevention/ld_Prevention_Avoid.htm) include using tick repellents, wearing long pants and sleeves, wearing light colored clothing, and tucking pant legs into boots or socks.

Early Tick Removal: It is important to perform daily tick checks (including groin, axillae, and scalp) after being outdoors in potential tick habitat and to remove any ticks with fine-tipped tweezers. Ticks generally do not transmit the Lyme disease bacteria (*Borrelia burgdorferi*) until they have been attached for at least 24 hours, so this may be a very effective prevention measure.

Prophylaxis for Deer Tick Bites: One randomized clinical trial has demonstrated that in highly endemic areas, a single 200 mg. dose of doxycycline reduces the risk of Lyme disease after being bitten by a deer tick, if the tick has been attached for at least 36 hours (i.e., the tick is engorged) and if the dose can be given within 72 hours of removing the tick. Patients should still be told to seek medical attention if they later develop symptoms consistent with Lyme disease (http://content.nejm.org/cgi/content/full/348/24/2424?ijkey=LruxMS3G8zCPA&keytype=ref&siteid=nejm)

Vaccine: A safe and effective Lyme disease vaccine became available in 1999, but was withdrawn from the market in early 2002 because of poor sales. Other candidate vaccines are in development.

Education: Recognition of the signs and symptoms of early Lyme disease has improved greatly among health professionals and in the general public over the past decade, and continuing efforts to improve awareness through dissemination of reliable information is critical. Unfortunately, a great deal of the available material on the internet and elsewhere, purporting to advance Lyme disease awareness, is inaccurate and/or misleading. (http://www.cdc.gov/ncidod/dvbid/lyme/resources/LD_Internet.pdf) . One consistently reliable and useful website for public information is maintained by the American Lyme Disease Foundation (www.aldf.com).

Other Issues:

Disease Reporting and Consultation: Health professionals should report Lyme disease cases (including clinically-diagnosed cases of *erythema migrans*) to the Bureau of Health by phone (1-800-821-5821) or by fax (1-800-293-7534). Case report forms may be downloaded at : (http://www.maine.gov/dhhs/boh/ddc/lyme.htm)

Tick Identification: Persons wishing to submit ticks for species identification may send them in a small crushproof vial in 70% alcohol to the Vector-borne Disease Laboratory, Maine Medical Center Research Institute, 75 John Roberts Road, Suite 9B, South Portland, ME 04106. There is no charge for this service. Instructions for submission and forms may be downloaded at: http://www.mmcri.org/lyme/submit.html.) For more information call (207) 662-7142.

Other Tickborne Infections: In Maine, the deer tick can also transmit two other infectious diseases, although they occur far less commonly than does Lyme disease. *Babesiosos* and *Human Granulocytic Ehrlichiosis* (also known as *anaplasmosis*) occur primarily in south coastal areas of the state and often present as undifferentiated febrile illnesses. Detailed information on recognition and management of these infections can be found in the August 2005 edition of the Maine Epigram (http://www.maine.gov/dhhs/boh/ddc/epigramhome.html).

Powassan encephalitis is an uncommon but potentially severe infection, biologically related to West Nile Virus infection, transmitted by the woodchuck tick. In Maine, 4 cases were reported between 2000 and 2004.